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NOTES ON REPTILES AND AMPHIBIANS
OF OKMULGEE COUNTY, OKLAHOMA

During the summer of 1924, between June 16 and November 1, intensive collecting was done in Okmulgee County, Oklahoma. The following is a list of the species taken. Specimens of all except the two turtles are in the Museum of Zoology of the University of Oklahoma.

AMPHIBIANS

Bufo woodhousii, *Acris gryllus*, *Hyla versicolor*
versicolor, *Rana catesbeiana*, *Rana sphenoccephala*,

REPTILLIA

Crotaphytus collaris collaris, *Sceloporus consobrinus*, *Ophisaurus ventralis*, *Cnemidophorus sexlineatus*, *Plestiodon fasciatus*, *Diadophis punctatus arnyi*, *Heterodon contortrix*, *Opheodrys aestivus*, *Coluber constrictor flaviventris*, *Masticophis flagellum flagellum*, *Elaphe obsoleta confinis*, *Pituophis sayi sayi*, *Lampropeltis getulus holbrooki*, *Lampropeltis triangulum sypila*, *Natrix grahamii*, *Natrix septemvittata*, *Natrix transversa*, *Storeria dekayi*, *Tropidoclonion lineatum*, *Thamnophis proximus*, *Thamnophis sirtalis parietalis*, *Chelydra serpentina*, *Terrapene carolina triunguis*.

Of 94 specimens of Bull frogs examined, only 13 stomachs were found to be empty. An examination of the other stomach contents yields the following results: 1% each Arachnida and snails, 2% Cicindelidae, 2.6% Scarabaeidae, 4% Formicidae, 21% Elateridae, 6% Carabidae (*Pterosticus lucublandus*), .6% each Carabidae (*Calosoma scrutator*), Caladridae, Cucujidae, 7% Locustidae, 22% Dyatiscus, 10% Larva, 3% each grit and Coccinellidae, 14.5% Crayfish.

Of the 46 specimens of Southern Leopard frog, 10 had empty stomachs, while the remaining 36 contained 38% Elateridae, 16% Myrmicidae, 11% larva, 4.5% each Lachnosterna and Coccinellidae, 1.8% each Saldidae, Belostomidae, Scarabaeidae (Tumble Bugs and June Bugs), and Cucujidae, 2.7% each Formicidae and Dytiscidae, and .9% each Lamiinae, Cicindellidae, Membracidae and Crayfish.

Of the food content of 21 specimens of *Bufo woodhousii*, 47% was found to be Formicidae, 19% Meloidae, 13% Carabidae, 12% Scarabaeidae, 1% Calandridae, 6.5% Dytiscidae, 4% each Cucujidae and Myrmicidae, 2% Elateridae, and less than 1% each Coccinellidae, Cicindelidae, Staphylinidae and larva.

The Common Sand Lizard, *Cnemidophorus sexlineatus*, was represented by 29 specimens, 11 only having no stomach content. The remaining 18 contained 52% Locustidae, 15% Arachnida, 16% Myrmicidae and Formicidae, 3.5% Elateridae, 9% larva with 1% each Mayfly nymph and Mosquito wigglers. 12 Swifts (*Sceloporus consobrinus*) and 9 Mountain Boomers (*Crotaphytus collaris collaris*) contained over 90% each Formicidae and Myrmicidae, in addition to Arachnids, Locustidae, and Carabidae. *Ophisaurus ventralis*, the "Glass Snake" contained one *Melanophus femus-rubrum* and one *Pterosticus lucublandus*, while the Blue-tailed lizards (*Plestiodon fasciatus*) were empty.

Many of the Serpents had empty stomachs or the food was digested. Yet small animals, such as field mice, and small garter snake were disgorged by *Lam-*



propeltis or "milk snake" when it was captured. Tadpoles and minnows were found in *Thamnophis*, our common garter snake, while the food of the Colubrids or Racers was entirely insectivorous, being Coleoptera and Locustidae.

Repeated discovery of the same specimens in similar habitats throughout the county led to expectancy of certain species. The lizards were most often found among the rocks and trees, on the hills together with the *Coluber constrictor flaviventris*, *Masticophis flagellum flagellum*, *Elaphe obsoleta confinis*, and the shy *Storeria dekayi* and occasionally *Thamnophis proximus*.

Terrapene carolina triunguis were found in or near a stream, in the woods, in the meadows, or as often as not, angling across the road. The garter snakes and some of the smaller water snakes (*Natrix septemvittata*, *Natrix grahamii*, and *Tropidoclonion lineatum*) frequented the water holes and small streams, sometimes projecting rocks in dry creek beds. The larger water snakes (*Natrix transversa*) and Common Snappers (*Chelydra serpentina*) chose the larger streams and ponds. *Opheodrys aestivus*, the green snakes, were among the stones and leaves at the edge of the wooded meadow, where also was found *Lampropeltis getulus holbrooki*, the King snake. *Pituophis sayi sayi* (Bull snake) appeared in the gardens, golf course, or open meadows with *Heterodon contortrix* (the Hog nose) and *Diaophus punctatus arnyi* (the Ring-necked snakes).

EDITH R. FORCE

ANALYSIS OF THE GENERA OF ANCHOVIES OR ENGRAULIDAE

The Junior author of this paper has recently made a critical study of the anchovies contained in the Museum of Comparative Zoology at Cambridge. In connection with the investigation of these and other anchovies it has been possible to arrange the species in genera more

naturally than has hitherto been possible. The family falls naturally into four groups here called sub-families. The *Stolephorinae* of the East Indian coasts are the most primitive as also the most highly developed of these fishes, being especially characterized by the presence of ventral scutes as in their presumptive ancestors, the *Clupeidae*. All these are Asiatic forms, two species (*Stolephorus evermanni* and *Stolephorus apiensis* Jordan and Seale) extending eastward to Samoa.

An offshoot from the *Stolephorinae* is the *Coiliinae*, a peculiar group of elongate fishes. The multitude of American species belong to the *Anchoviinae*, characterized by the absence of the ventral scutes, and in general by the feebleness of structure. One of these (*Anchoviella purpurea* Fowler) extends westward to Hawaii.

The *Engraulinae* belong to temperate regions, species being found in Europe, Australasia and the coasts of Japan, California, and Chile, none however on the Atlantic Coast of America. The species of this group, however widely diffused, are all very closely related.

GENERA OF ENGRAULIDAE

- a. COILIINAE. Body greatly elongate; pectoral fin with 4 to 6 upper rays produced as slender filaments; caudal not forked, its lower part united to the many rayed anal; gill rakers 20 to 30, on lower half of its first gill arch, this counted in all cases. (Genera Asiatic.)
- b. Body very long, acute at base of caudal, anal rays 80 to 110. (Pacific Coasts of Asia, type *Coilia hamiltoni* Gray.) COILIA GRAY
- bb. Body shorter, rounded at base of caudal; anal rays 35 to 40. Pacific Coast of Asia. (type *Coilia quadragesimalis* C. & V.)

DEMICOILIA JORDAN & SEALE

- aa. Body not greatly elongate, the anal fin free from the caudal which is strongly forked.
- b. STOLEPHORINAE. Ventral margin armed with

bony scutes or serrae; body compressed; anal fin long, its insertion not far from that of dorsal; maxillary more or less broadened behind; alar scale at base of caudal often obsolete; gill rakers 15 to 30. (Asiatic Genera.)

- c. Uppermost ray of pectoral produced in a long filament; mouth moderate; a small free spine before dorsal; the very long anal fin beginning before origin of dorsal; alar scale present; gill rakers 18 to 21; vertebrae 46 to 56; anal rays 50 to 75.

- d. Lower jaw projecting beyond upper. East Indies. (type *Stethochaetus biguttatus* Gronow.)

STETHOCHAETUS GRONOW

- dd. Lower jaw included: India and East Indies. (type *Clupea telara* Hamilton.)

SETIPINNA SWAINSON

- e. uppermost ray of pectoral not produced.

- f. Maxillary greatly prolonged, extending to base of pectoral or beyond; axillary scale obsolete; vertebrae 41; gill rakers 10 to 18; anal rays 35 to 40. China to India. (type *Clupea setirostris* Broussonet.)

THRISOCLES JORDAN

- ff. Maxillary of moderate length, not extending beyond gill opening.

- g. Insertion of anal before front of dorsal, the fin long, of 45 or 46 rays; no free spine before dorsal; canine teeth present, gill rakers 9. (type *Engraulis crocodilus* Blecker.)

LYCOTHRISSA GUNTHER

- gg. Insertion of anal behind front of dorsal.

- h. Jaws with sharp canines; gill rakers 14; vertebrae 48; dorsal preceded by a free spinule; anal rays about 45; ventral scutes strong. East Indies. (type *Xenengraulis spinidens* Jordan and Seale).*

XENENGRAULIS JORDAN & SEALE

**Xenengraulis spinidens* Jordan and Seale.

A new species from India, the type No. 4413, Mus. Comp. Zool. from Siam; others from Calcutta (18054) and Rangoon (178067) Head 3 in length, depth 3 1-5, Dorsal rays 1, 13, A. 46, vertebrae 48. Canine teeth 15 on each side of lower jaw; snout not projecting, ventral scutes 17 and 10.

hh. Jaws without canine teeth.

i. Dorsal preceded by a free spinule.

j. Ventral scutes strong, developed from gill opening to vent; vertebrae 45 to 48; anal rays about 40. East Indies. (type *Thrissa hamiltoni* Gray.)

SCUTENGRAULIS JORDAN & SEALE
(new genus)

jj. Ventral scutes weak, developed from ventrals to anal only, these almost hidden by the scales; scales firm; teeth even; no silvery lateral stripe; vertebrae 39 or 40; gill rakers 23; anal rays 32. Red Sea to East Indies. (type *Clupea boelama* Forskal.)

THRISSINA JORDAN & SEALE (New genus)

ii. Dorsal with no free spinule in front. Ventral margin with 2 to 7 sharp scutes between pectorals and ventrals; teeth even; body translucent, usually with a silvery lateral stripe; vertebrae 39 to 43; gill rakers 22 to 28; anal rays 15 to 37; origin of anal fin behind that of dorsal. East Indies, South Seas, India. (type *Stolephorus commersonianus* Lacepede.)

STOLEPHORUS LACEPEDE

bb. Ventral margin rounded or compressed; alar scale large, belly without scutes.

k. ANCHOVIINA. Vertebrae relatively few, about 40 so far as known, skeleton firm, body translucent, compressed, usually but not always with a sharply defined silvery lateral stripe as in *Stolephorus*.

l. Origin of anal fin before that of dorsal.

m. Jaws with sharp canines, those of lower jaw largest; anal rays 25 to 46; vertebrae 42; gill rakers 19 to 26. Coasts of Brazil. (type *Engraulis grossidens* Cuvier.)

LYCENGRAULIS GUNTHER

mm. Jaws without canines, the teeth all small and even, pectoral fin very long; vertebrae 45; gill

rakers 14, anal rays 32. Brazil and Guiana.
(type *Clupea atherinoides* L.)

PTERENGRAULIS GUNTHER

- ll. Origin of anal fin behind that of dorsal, teeth small, even.
- n. Gill membranes nearly separate, not united across the isthmus.
- o. Gill rakers relatively few, 12 to 50.
- p. Mouth large; maxillary straight, narrow, somewhat pointed behind. Atlantic Coasts of America, Cape Cod to Brazil. (type *Engraulis per fasciatus* Paey.)

ANCHOVIELLA FOWLER

- pp. Mouth small, herring-like; maxillary curved, rather broad, rounded behind. Isthmus of Panama to Brazil. (type *Engraulis brevirostrum* Meek and Hildebrand.)

AMPLOVA JORDAN & SEALE

- oo. Gill rakers very many, 95 to 120; body much compressed, snout short; ventral margin sharp, but without scales; anal fin moderate, of about 30 rays. Panama and Southward. (type *Engraulis macrolepidotus* Kner and Steindachner.)

ANCHOVIA JORDAN & EVERMANN

- nn. Gill membranes broadly united across isthmus; gill rakers numerous, 52 to 57; vertebrae 41; anal fin moderate, of 20 to 25 rays. Panama and West Indies. (type *Engraulis edentulus* Cuvier).

CETENGRAULIS GUNTHER

- kk. *ENGRAULINAE*. Vertebrae 46 to 50, skeleton feeble; body slender; little compressed, flesh oily, sides silvery, but without distinct lateral stripe; gill rakers long and slender, 36 to 43.
- q. Pectoral fin very long, reaching tip of the long ventrals; body slender (Miocene: extinct). (type *Engraulites remifer* Jordan & Gilbert. J. Z.)
- qq. Pectoral fin short, not reaching base of ventrals. Vertebrae 46 to 47; skeleton fragile; flesh only;

body subcylindrical, little compressed, silvery, but without lateral stripe; gill rakers slender, about 40. Coasts of Europe, New Zealand, Australia, Chile, California, Japan. (type *Clupea enchrasicolus* L.) *ENGRAULIS* CUVIER

DAVID STARR JORDAN AND ALVIN STEELE

THE EGG LAYING OF THE PURPLE SALAMANDER

In Copeia of June 25, 1915, p. 14, Mr. Philip H. Pope mentions finding the larvae of the purple salamander *Gyrinophilus porphyriticus* about April 19, 1915, one of which, three inches long, he thought about a year old and five more smaller ones which he estimated to be newly hatched.

Mr. R. W. Wehrle sent me fifteen eggs and one specimen of an adult *Gyrinophilus porphyriticus* which he had found August 8, 1924 about two miles from Indiana, Pennsylvania. They were found in an old spring which was filled up with stones and brush and were clustered to the bottom of a fair sized stone over and around which the water was flowing. A number of other purple salamanders were found in this spring near the stone; no other species were found.

Each egg is enclosed in an individual jelly-like transparent mass which maintains its spherical shape when in the water. They are about nine mm. in diameter and were fastened together and to the stone so tight that they were removed with difficulty. Their color is a tawny olive which probably is largely due to the mud of the bottom. The dissection of three of these eggs showed that the head folds of the embryo were just starting to develop and would indicate that they were but a few days old.

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